4610

NSTRUCTIONS AND APPLICATIONS

Inverter Type 4610

A Level Recorder accessory enabling the recording of DC- and low frequency voltages up to 20 c/s.

- Acoustic standing wave apparatus
- Artificial ears
- Artificial voices
- Audio frequency spectrometers
- Audio frequency voltmeters
- Automatic A. F. spectrum recorders
- Automatic frequency response recorders
- Beat frequency oscillators
- Condenser microphones
- Deviation bridges
- Distortion measuring bridges
- Electronic counters
- Frequency analyzers
- Frequency measuring bridges
- Frequency response tracers
- Hearing aid test apparatus
- Heterodyne voltmeters
- Level recorders
- Megohmmeters
- Microphone amplifiers
- Microphone calibration apparatus
- Noise sources
- Polar diagram recorders
- Preamplifiers
- Recording paper
- Rotary selectors
- Strain gauge apparatus and accessories
- Surface roughness meters
- Vibration pick-ups
- Wide range vacuum tube voltmeters

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Description.

The Inverter Type 4610 is designed as an accessory to the High Speed Level Recorder 2304 for the recording of D. C. and slow A. C. signals.

The essential component of this instrument is an A. C. /D. C. chopper which is excited by a built-in 400 c/s oscillator. A very low noise level is obtained by means of a careful screening of the chopper and the oscillator.

The D. C. signal to be recorded is led to the usual input terminal of the recorder potentiometer. The connection between the potentiometer slider and the amplifier of the recorder is cut off by means of the switch on the recorder, and the chopper is inserted in this lead. In this way the D. C. signal from the potentiometer slider is converted to a 400 c/s A. C. signal, and the amplifier and servo system of the recorder will work in the usual way. The wave form of the resulting voltage led to the amplifier input is not strictly rectangular due to the time constant of the applied R. C. circuit being comparable with the 400 c/s period, but is as shown in fig. 1. There-

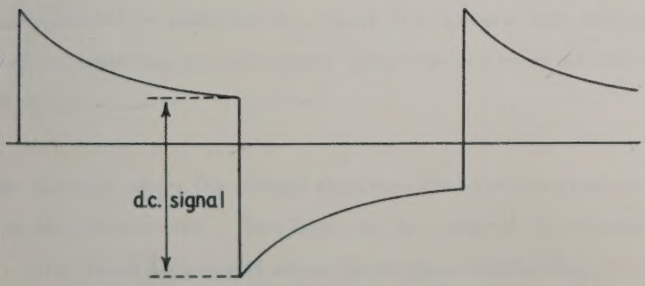

Fig. 1.

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fore the peak value of the 400 c/s A.C. signal will be less than the input D.C. voltage, but more than half of this last value. This decrease is easily compensated for by increasing the amplification in the Level Recorder by means of the gain control, in case the built-in 10 mV A.C. reference voltage of the Level Recorder should be used as reference value. For a more proper adjustment, however, it is recommended to use one of the directly available D.C. bias voltages of the Inverter itself as exact reference voltage.

The recording of slow A.C. signals is possible when the signal is given a D.C. bias, so that even the negative peak value of the signal is higher than the zero level of the recorder. This bias is supplied by a built-in stabilized rectifier and can be varied in steps of 10 db from 10 mV to 1 V. It can also be used as a reference voltage for controlling the proper setting of the gain control.

Power Supply.

The Inverter can be operated from a 220, 150, 127 or a 115 volts A.C. power line. Power consumption is about 13 watts. The proper voltage is selected by means of a switch which is operated with a screwdriver through a hole in the rear plate of the instrument. The voltage selected is indicated by a pilot disc ganged with the switch. During the switching the instrument should be disconnected from the power line.

A fuse directly above the voltage switch is placed in the primary circuit of the transformer. The fuse can be replaced by loosening a cover plate which is mounted above the voltage switch, thus obviating the necessity for removing the rear plate of the instrument.

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If it is desired to operate the instrument from a D.C. line or an accumulator a vibrator unit or other converter is required.

Operation.

If the D.C. signal to be recorded is expected to have only one polarity with respect to ground during the time of recording, it can be applied to the input terminal of the potentiometer without using the D.C. bias of the Inverter. The two screened jacks on the Inverter marked "amplifier" and "slider" are connected to the jacks on the recorder with the same markings by means of two screened cables, and the toggle switch in the left hand corner of the recorder is set to the position marked "slider free". A zero level of 10 mV A.C. voltage is placed by means of the gain control on the 7 db line of the recording paper. As the zero level of the Recorder is adjustable from 3 to 12 mV, this seven db increase of the Recorder's sensitivity is quite possible. This increase consists of a 4 db part to make the peak value of the input signal equivalent to the original D.C. voltage, plus a 3 db part originating from the fact that the Level Recorder responds to peak value and the reference value is 10 mV A.C. r.m.s.

A more direct and exact procedure is to take the 10 or 100 mV D.C. bias from the Inverter itself as reference voltage. Herewith the input jack of the potentiometer on the Level Recorder is connected by means of a screened cable with "potentiometer" on the Inverter, while the jack "input" is short-circuited. The positive D.C. voltage of the outer bushing is thus led to the Level Recorder input and functions now as a direct reference, which can be set by means of the gain control to an arbitrary height on the recording paper.

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With the various adjustments all types of input potentiometers can be used on the Level Recorder. As the input signal to the amplifier has a frequency of approx. 400 c/s, the "lower limiting frequency" adjustment should be set to a value lower than 400 c/s. In most cases 80 c/s will be the best choice.

When recording slow A.C. signals or D.C. signals with shifting polarity the D.C. bias supply for the Inverter should be used. The signal to be recorded is then applied to the input terminal of the Inverter, and the screened jack marked "potentiometer" is connected to the potentiometer jack of the recorder. A suitable bias is selected by means of a bias switch on the Inverter, the bias being so high that even the negative peak value of the signal is higher than the zero level of the recorder. A reference adjustment is carried out as before, short-circuiting the input of the Inverter. This reference value is not placed, however, on the zero db line of the recording paper, but so that the most negative value of the voltage can be recorded.

When using the D.C. bias system of the Inverter care should be taken if the signal source has a ground connection. In this case a possible ground connection to the Level Recorder should be removed for reasons which are obvious from the circuit diagram.

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